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AUTHOR Tulloch, Deborah
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ABSTRACT

It is suggested that curricula for young multiply handicapped children should be based on well articulated child development models which specify milestones to be demonstrated as well as contexts in which they will be demonstrated. It is further suggested that the criterion of ultimate functioning should also be considered in choosing one design over another. Two areas of early development that are frequently problematic for young multiply disabled children--functional motor and sensory integration skills--are examined in terms of typical and atypical sequences of development and suggestions for curriculum design. Cautions are urged for imposing unstructured, intense sensory stimulation on the young child, and techniques for structuring appropriate levels of stimulation are discussed. Considerations in materials selection and adaptation are noted. (CL)

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CURRICULUM DESIGN FOR YOUNG MULTIPLY DISABLED CHILDREN[1]

Deborah Tulloch, M.Ed.[2]

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[1] Paper presented at *Infants, Toddlers, and Parents: Educational and Clinical Design*; Teachers College, Columbia University

[2] Instructor, Department of Special Education, Teachers College, Columbia University

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Introduction

Educators working with young multiply disabled children are often presented with significant challenges in curriculum design. Due to the diverse needs of these children, as well as the fact that many of them are non-overtly responding, educators may find themselves without rationales and instructional approaches that are easily evident and applicable. What results is an "ad hoc" quality in curriculum design for young multiply disabled children; we may eagerly place children's hands and arms up to the elbows in dried macaroni with little clear sense of reasons for doing so and ultimate outcomes predictable in order to enhance growth.

A reason for this impromptu nature of curriculum design may be the lack of well articulated child development models as the bases for educational planning. It may seem inconceivable to educators that the development of young multiply disabled children would share commonalities with that of more typical, "normally" developing children and so models are overlooked in curriculum design. Secondly, when child development models are used as reference points, be they those of Gesell or Piaget for example, there is a danger in narrowly teaching to the behaviors designated at particular chronological ages. A mistaken impression results that using a developmental scale comprised of quantified milestones constitutes an adequate curriculum. Young multiply disabled children demonstrating

obvious atypical growth patterns will be penalized ultimately as their limited repetoire of observable behaviors fails to fit into the neatly delineated milestones of developmental scales. The end result is a general perception that young multiply disabled children can not "do" since their growth patterns appear not to obviously correspond to more typical ones represented by discrete bits of behavior on a printed page. Thus these children are relegated to the limbo of the "low-functioning" abnormal with access denied to the world of the "high-functioning" normal as the omnipresent cycle of reduced expectations and performance occur continuously.

It is proposed that successful curriculum design for young multiply disabled children needs to be based on typical child development models as a starting point. Curriculum design includes not only behaviors (i.e., milestones) to be demonstrated, but specific contexts in which they will be shown including people, objects and events. Rationales for choice of certain types of design over others should additionally keep in mind the criterion of ultimate functioning for multiply disabled individuals (Brown, Nietupski & Hamre-Nietupski, 1976). Using typical child development models as an initial reference point enables educators to map out a game plan of the possible direction growth might occur in their young multiply disabled students. It is likely that use of typical child development models in this way will indicate what learning experiences to attempt first as least successful ones are eliminated for

individual students. Eventually a successful match between the learning needs of the young multiply disabled child and curriculum design can occur as approaches used with more typically developing children are adapted in response to individual student feedback cues.

The focus of this article is to examine two areas of early development that are frequently problematic for young multiply disabled children--the development of functional 1) motor and 2) sensory integration skills. Typical and atypical sequences of development will be examined in each area as well as suggestions for curriculum design based upon a synthesis of both sequences. While the developing sensory and motor systems in young children are dynamically interrelated (Connor, Williamson & Siepp, 1978), in this paper for the purposes of explication only are they considered separately.

Curriculum Design for Early Motor Skills

Active movement experienced in early motor development cannot be underestimated as a source of learning for the young child. Certain principles guiding this development can be identified: 1) development occurs sequentially over time with each new skill demonstrated based upon previous ones; 2) these developmental sequences typically overlap as already demonstrated skills are mastered and refined while newer ones are experimented with; 3) increased maturation is evidenced by the dissociation of movement patterns from those

that involve the total body to those that involve more fine and selective patterns; 4) development proceeds in a cephalocaudal direction, i.e., from the head downward to the toes, as head, then trunk, pelvic, and finally lower limb control are achieved in a sequential way; 5) development also proceeds in a proximal to distal direction, i.e., from the midline of the body to the periphery, as control of shoulder and upper arm movements are mastered prior to that of more refined hand and finger movements (Connor et al., 1978).

Based upon this knowledge of the sequential nature of early gross motor development, some initial guidelines in curriculum design for young multiply disabled children can be identified. First, it should be determined where along the continuum of motor skills the child is presently functioning. For example, if head control has developed to the degree that the child can lift and maintain it independently in a prone position, then the development of trunk control would appear to be the next logical area to be facilitated. Once the child can maintain the head, neck and trunk in stable upright positions, then the development of independent sitting skills can be attempted. As for the demonstration of complex ambulatory skills, numerous prerequisite skills, i.e., crawling, creeping, pulling to stand, weight bearing on both feet, need to be mastered in a variety of environments. Failure to identify the point(s) in the sequence of motor skills where a young multiply disabled child is showing skill development can lead to unrealistic expectations and a

substantial lack of success for child and teacher if crucial prerequisite skills are overlooked.

Not only does knowledge of the sequence of early motor development suggest a vertical progression of skills for the young multiply disabled child but a horizontal one as well. It is possible that due to the severity of some multiply handicapping conditions seen in young children (e.g., cerebral palsy), some levels of motor skill may never be demonstrated. Thus to work on an area of motor skill development just because it appears next in the hierarchy of skills is highly inappropriate and establishes another cycle of failure for child and teacher. For example, if independently assumed trunk and pelvic stability do not appear to be attainable by a child in the near future, the enhancement of an endless number of head control skills in a horizontal or lateral progression can occur. Head control might be maintained for: 5, 10, or 100 seconds; in prone positions of different elevations from the ground or in supported sitting positions of varying heights; with the head stationary or rotating 45, 90, 180 degrees or greater.

Knowing about the sequence and scope of early typical motor development enables educators to describe in positive and, most importantly, functional ways what the young multiply disabled child can do. As described by Fiorentino (1973), whether the child demonstrates motor skills that are basically apedal (assumes only positions of supine and

prone), quadrupedal (assumes crawling and sitting positions) or bipedal (assumes standing positions and can ambulate), the educator has a framework that offers a logical evaluation of present motor development status concomitant with a blueprint for future skill enhancement.

It is of value to examine as well the nature of atypical motor development when planning curriculum for young multiply disabled children. Atypical development proceeds in a manner similar to typical development except that many of the normal components may be missing. Because of these missing components the young child learns to compensate in the form of primitive reflex patterns that eventually become pathological and non-functional (Bly, 1983).

The typically developing young child during the first weeks and months of life is able to capitalize on what are basically primitive reflexive movements by integrating them into the higher levels of the central nervous system. The result is that movement over time becomes increasingly less reflexive, more under voluntary control (Connor et al., 1978) and characterized by a progression from the most automatic and most organized to the least automatic and least organized (Jackson, 1958). In contrast, for the young multiply disabled child who evidences atypical motor development, these primitive reflexive patterns are never completely inhibited; the end results are movements dominated by reflexes that have become pathological, the lack of

development of more complex voluntary motor skills, and concomitant increased abnormal muscle tone throughout the body (Bly, 1983).

The asymmetrical tonic neck reflex (ATNR) is an example of a primitive reflex pattern in early motor development that often persists pathologically in atypically developing children. Believed to be related to hand-eye coordination in later development, elicitation of the ATNR in typical infants leads to the assumption of a "fencing" position: as the arm and leg extend outward on the side to which the head is turned, the arm and leg on the opposite side assume a flexed position. The typically developing infant is able by the age of 4 to 6 months to break out of the domination of the ATNR pattern and to move the head, arms and legs independently of each other (Fiorentino, 1972). In contrast, the atypically developing child will tend to be locked into the ATNR position and assume it whenever the head is turned to one side in most, if not all, positions. The effect of the ATNR's persistence on development is pervasive since the child is unable to move the head independently of the rest of the body. Limitations are placed on the visual field, the development of hand-eye coordination for objects at midline and full integration of the sensory modalities (Connor et al., 1978).

Once a pathological reflex pattern such as the ATNR has been identified in a young multiply disabled child, the goal of the educator should be to insure that this abnormal

pattern is not used in movement experiences. Using a neuro-developmental approach (NDT), the pathological reflexes are inhibited into order to facilitate normalized muscle tone and ultimately, movements (Bobath & Bobath, 1972). Strategies can include: 1) the reduction and resulting normalization of muscle tone by downward rhythmical rocking and rolling of the key points of the body such as the shoulders, elbows, wrists, knees and ankles (Connor et al., 1978); 2) the use of adaptive equipment as described by Finnie (1975) in placing the child prone over a wedge with shoulders and arms extended forward to inhibit the ATNR pattern and to facilitate use of the arms and hands at midline; 3) placement of the child into positions that facilitate the head's movement independent of the rest of the body--e.g., in the "curl" position the child is flexed symmetrically into a semi-fetal position so that the head is free to rotate from side to side dissociated from the arms and legs (Davis, 1981). Fundamental to motor intervention strategies for young multiply disabled children are efforts to insure that movement be elicited in functional contexts and not just for its own sake. Thus for a child placed in the "curl" position, an appropriate way to elicit rotation of the head and neck would be to present auditory or visual stimulation on either side of the body as head turning is reinforced. In this way, not only are more typical motor skills enhanced, but additionally the child's

cognitive and affective awareness of his/her active participation in environmental events.

Curriculum Design for Enhancement of Sensory Integration Skills

In this section, the development of skills that enhance the integration of complex sensory information will be considered as the basis for instructional strategies with young multiply disabled children who may be developing atypically in this area. As with the discussion on motor skill enhancement, the assumption is that it is valuable for the educator to know about the typical development of sensory integration skills in order to 1) recognize problems in young multiply disabled students and 2) arrive at effective remediation techniques.

Some theorists believe that the early awareness of sensory information demonstrated by infants can be described as amodal. For example, in response to a sound eyes, ears, nose and hands are likely to be aroused (Bower, 1982). This awareness level of sensory information is manifest by changes in the infant's behavior as the activity level is increased or decreased. Thus in responding to the sound of a bell, the infant might demonstrate awareness by either increasing or decreasing vocalizations or movement as the input of the environmental event is processed. The bell's sound is not so much heard as it is amodally seen, felt, and smelled as well (Bower, 1982).

During the course of development, these undifferentiated non-specific responses become more refined as an intersensory coordination occurs. The responses of the young child to sensory information become then more stimulation specific. Visual input is more likely to be "seen", auditory to be "heard", tactile to be "felt", and so on (Bower, 1982). As an example, in response to visual stimulation the young child will first fixate on objects or people at close and then longer distances in the center of the visual field. Later visual tracking of stimulation moving 90, 180 degrees or more will occur as higher levels of skill are developed. The relation of basic visual fixation and tracking skills to advanced cognitive functioning is evident when the young child first looks at, then recovers objects hidden out of view in demonstration of concepts of object permanence (Uzgiris & Hunt, 1975). Similarly, in the development of auditory skills first localization of sound stimulation occurs followed by a tracking of noise-making objects or people (Bayley, 1969).

Knowing landmarks of the early development of sensory integration skills can enhance the identification of the present functioning levels of young multiply disabled students who may seem to be generally unaware of any environmental stimulation. It is important to remember that their responses are likely to be atypical and vary according to present needs as well as past experiences. Also, as was seen in motor skill development, the level of sensory

integration evidenced is often basic and reflexive. For example, in response to a sound produced 12 inches from the ear, awareness might be shown by a suckle-swallow behavior. When reflexive behavior is observed in response to sensory stimulation, what is important is not the primitive nature of the response, but rather the fact that a response was elicited in a type of child considered to be non-overtly responding and seemingly impenetrable to any type of stimulation. The presence of an awareness-level response to sensory stimulation should be viewed by the educator as a positive indication that the environment is impacting upon the child. However basic the child's present responses might be, they offer a starting point in curriculum design.

Once the responses to sensory stimulation have been identified as being reflexive, the next step is to inhibit their hypersensitive nature so that higher level, fully integrative responses can occur. For example, oral tactile sensitivity is characteristic of young multiply disabled children as seen in aversive reactions to stimulation in the facial area. Initially it might be helpful to avoid the oro-facial area completely and tactually-kinesthetically stimulate parts of the body much further away in rhythmically moving arms and legs up and down and sideways as music is played. Specific stimulation of the oro-facial area would then be done gradually as the child's hands are brought to the face with body parts named in mirror play with the teacher. Only after the facial area had

been desensitized could approaches then be made to the oral area as small portions of the outside, then the inside of the mouth are stimulated with soft rubber toys, the child's own fingers or those of the teacher (Connor et al., 1978). It is believed, then, that the reduction of reflexive, hypersensitive reactions to sensory stimulation would enable the young multiply disabled child to process sensory stimulation more functionally in developing higher integrative responses.

Higher sensory integrative responses that are possible only after non-functional reflexive ones have been reduced or eliminaced may not necessarily be elicite spontaneously in the young multiply disabled child; rather, they may have to be trained or learned in experiences designed by the educator. This can be accomplished when instructional strategies involving complete or partial physical guidance cues are used. For example, in facilitating the development of tracking responses to visual stimulation, the child's head could be guided by the placement of the teacher's hands on either side so that the head moves in conjunction with the trajectory of the moving stimulus. Gradually, the use of complete physical guidance could be faded to partial guidance with the placement of the teacher's fingertips on either side of the head. Even if the child is unable to move the head independently to visually track moving objects due to a severe motor disability, the benefits of guided sensory exploration can not be undervalued as concept

development is enhanced. What is learned is that objects moving within the visual field can continue to be visually apprehended as vision is intercoordinated with movement.

Substantial cautions need to be exercised in manipulating the sensory environment for young multiply disabled children. First and foremost is that the imposition of unstructured, intense sensory stimulation can considerably reduce the child's ability to organize and integrate the information. More is not better and overstimulation can result in an overloading of the central nervous system. This overload may be first indicated by hypersensitive reflexive reactions, followed by withdrawal and non-responses (Ayres, 1972). Given the multi-sensory nature of some of the environments experienced by young multiply disabled children (e.g, long bus rides, busy classrooms, hectic dayrooms, cafeterias or waiting areas), it is possible that some of the observed non-responsiveness of these children that contributes to their questionnable description as "low-functioning" may in fact be a manifestation of sensory overload. The problem would appear to lie not so much in the child as in environments that are inappropriate and non-conducive to learning.

In terms of creating structured, positive sensory experiences, the more basic ones of tactile, kinesthetic and vestibular stimulation should not be overlooked as starting points. In use of tactile experiences, it is recommended to touch purposefully, with firmness and

without sudden imposition that could elicit a startle reaction in the child. Many of the light quick strokes and patting that are imposed upon the faces of young multiply disabled children are more harmful than not since they can result in tactile hypersensitive reactions of lip retraction and facial grimacing with possible long-term aversion to the human touch. What is preferable in physical approaches to young multiply disabled children are touches involving deep pressure and hugs instead of patting or stroking of the facial area. Kinesthetic and vestibular stimulation are also powerful sources of sensory input as central nervous system organizers. They can have either calming or excitatory effects on the child being stimulated and so observation of what behavioral changes result from specific types of stimulation need to be made by the educator. Usually, repetitious rhythmical movements are inhibitory or calming while quick vigorous ones of short duration are excitatory (Dickey, 1979).

As for higher level sensory stimulation involving visual or auditory input, experiences need to be thoughtfully structured so that adequate processing and learning can occur. Visual stimulation is best processed when it is presented in limited ways so that the child is not bombarded by an abundance of colors, shapes, pictures and sizes. For example, the visual clutter in classrooms may result in the child's inattention to stimulation presented by the teacher. Storage areas can be covered with

doors or curtains of simple colors and harsh lighting can be reduced in efforts to enhance visual attending skills. Similarly for experiences involving auditory stimulation, isolation of sounds within the classroom through use of partitions, spacing of children and adults, and monitoring of unnecessary loud noises (e.g., adults talking loudly to each other across the room), can facilitate the young multiply disabled child's functional processing of information. A typical characteristic of classrooms for multiply disabled individuals is the use of loud music--"rock" or standard children's songs--as a way of adding sound stimulation that may be missing due to the non-vocal nature of the students. What inadvertently occurs is an overstimulation of sounds so that little is processed or integrated by the students. Instead, classical music is a more effective organizer of auditory stimulation wthin the classroom as it soothes and overrides other excessive, uncontrollable stimulation (Dickey, 1979).

Materials selection and adaptation can also enhance basic sensory integrative skills as well as higher level cognitive concepts. For children who have difficulty attending to visual stimulation because of visual or cognitive deficits, objects that 1) reflect light, 2) are comprised of large black and white patterns (e.g., bull's-eyes or checkerboards), 3) are comprised of a limited number of contrasting bright colors (but not pastels), can enhance the demonstration of fixation and tracking responses. When

auditory components are added as well to objects presented for visual stimulation, the added sound clues make more likely the perception of the object by the child. For children whose hearing is not intact, low vibratory noises or ones that can be felt as well (e.g., placing the child's hands on top of a drum as it is played) can enhance processing of auditory information. The important point to be made in reference to visual and auditory stimulation is to never assume that any child cannot "see" or "hear'. To deny access to a particular type of stimulation is to insure unwittingly that sensory integrative skills in that area will never develop.

One last area of materials development can be suggested that combines sensory input with motor output by the young multiply disabled child. It is of value to create and/or use objects that enhance concepts of causality which are important for cognitive as well as affective development. This can be accomplished by using whatever behaviors the child demonstrates voluntarily in acting upon objects or people in the environment. For example, if when placed in a supine position the child independently engages in reciprocal leg kicking, placement of a rubber squeeze-toy at the feet supported by a sandbag will result in the sensation of pressure and the production of noise as the toy is "kicked" by the child. The chronic experience of learned helplessness is for multiply disabled individuals the by-product of a lifetime of failing to be an active participant

in environmental events. It can be counteracted in early development if the child is allowed experiences that encourage active participation regardless of how rudimentary sensory or motor abilities might be. Or, to paraphrase Descartes--"I do, therefore I am".

Conclusion

It is apparent that much of the information base needed to create effective and appropriate curricula for young multiply disabled children comes from fields other than education--most notably, physical, occupational and speech therapies. It impinges upon us as educators to acquire the professional knowledge and skills necessary for working with the very atypical learners that are young children with multiple disabilities. In addition to pursuing specialized coursework in related areas, capitalizing on the resources of professionals with whom we are working and never hesitating to identify our own information gaps can have substantial positive impact on the success of our instructional strategies. In educating young children with multiple disabilities, the challenges that confront educators are numerous. By synthesizing knowledge derived from typical and atypical developmental patterns, traditionally presumed ceiling levels of performance for young multiply disabled children can only come tumbling down with endless benefits for them and their families, and our sense of self-worth as educators.

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